

New records and description of four new species of the genus *Agathotoma* (Gastropoda, Mangeliidae) in the Caribbean

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KEYWORDS. Gastropoda, Mangeliidae, *Agathotoma*, Caribbean, new records, new species

ABSTRACT. The species collected in the Caribbean and supposedly belonging to the genus *Agathotoma* are revised. Some new records are reported and four species new to science are described.

RESUMEN. Se revisan las especies recolectadas en el Caribe y supuestamente pertenecientes al género *Agathotoma*. Se refieren algunas citas nuevas y se describen cuatro especies nuevas para la ciencia.

INTRODUCTION

The genus *Agathotoma* Cossmann, 1899 was discussed by Powell (1966), who provided a description defining all the characters of the genus. He also listed the type species and gave examples of fossil and Recent species.

In a recent paper (Fernández-Garcés & Rolán, 2010) it is mentioned that in the revision of the Turridae by Powell (1966), 561 taxa names at genus or subgenus level are mentioned, from which 89 are in Mangeliinae. More recently new genera have been described, but unfortunately these descriptions are based on minimal morphological characters with no reference to soft parts, radula, DNA or the most important characters. In our opinion it is inadvisable to create new genera without first undertaking the broader studies that are necessary to give stability and future permanence to these new taxa. Experience indicates that families with many genera based on minimal morphological characters will have to be restructured in the future, creating many synonyms and causing many changes.

In West Africa there are also species which have been considered to belong to the genus *Agathotoma* as well as to the genus *Pyrgocythara* Woodring, 1928 (see Rolán & Otero-Schmitt, 1999). The latter genus has been employed for some species recently described (Fernández-Garcés & Rolán, 2010).

For the above-mentioned reasons we will present all the species studied in this paper in a well-established

genus, avoiding the use of other more recently described genera, for which we do not have complete information.

Abbreviations

ANSP: Academy of Natural Sciences of Philadelphia.
BMSM: Bailey-Matthews Shell Museum, Sanibel, Florida.
IES: Instituto de Ecología, La Habana
MCZ: Museum of Comparative Zoology, Harvard.
MNCN: Museo Nacional de Ciencias Naturales, Madrid.
MHNS: Museo de Historia Natural, Santiago de Compostela.
MNHN: Muséum national d'Histoire naturelle, Paris.
NHMUK: National History Museum United Kingdom, London.
USNM: National Museum of Natural History, Washington.
CCR: collection of Colin Redfern, Boca Raton, Florida.
CDK: collection of David Kirsh, Durham, North Carolina.
CFG: collection of Fernández-Garcés, Cienfuegos.
sp: specimen with soft parts.
s: shell.
f: fragment.
j: juvenile.

SYSTEMATICS

Superfamily CONOIDEA Fleming, 1822

Family MANGELIIDAE P. Fischer, 1883

Genus *Agathotoma* Cossmann, 1899

Type species: *Mangelia angusta* Jan, Miocene, Europe.

Agathotoma candidissima (C.B. Adams, 1845)

Figs 1A-F, 10A, 11A-B, Table 1

Pleurotoma candidissima C.B. Adams, 1845. *Proc. Boston Soc. Nat. Hist.* 2: 4.

Mangelia badia Reeve, 1846. Remarks in Krebs (1866): 396.

Pyrgocythara coxi in Warmke & Abbott, 1961: plate 25, fig. T.

Type material. Holotype in MCZ (186002), represented in Clench & Turner (1950, pl. 30, fig. 5) and in Williams (2006: 5510).

Type locality. Jamaica.

Other material examined. Cuba: 2 s, Guajimico, intertidal (MHNS); 2 s, Rancho Luna, Cienfuegos, 24 m (CFG); 1 s, Bajo de Sancho Pardo, 15 m (MHNS); 3 s, Rancho Luna, 20 m (MHNS); 3 s, Faro de los Colorados, Cienfuegos, 40 m (MHNS); 1 s, 1 j, Naranjo, Guajimico, Cienfuegos (MHNS); 6 s, 4 j, Itabo, Gavilán, Cienfuegos. 22°00'890"N, 80°24'832"W, 10 m (MHNS). Nicaragua: 2 f, Cayo Witties, 12 m (MHNS). Bahamas: Abaco: 14 s, 1 j, Sandy Point, intertidal (CCR); 1 s, 1 sp, Treasure Cay, 1 m (CCR); 5 s, Chub Rocks, 10 m (CCR); 27 s, 5 j, off Chub Rocks, 23 m (CCR).

Description. See C.B. Adams (1845) and Clench & Turner (1950). The protoconch has a diameter of about 400 µm, with about 2.25 whorls; the first part (about 1.75 whorls) is smooth but immediately small ribs begin in the suture and are complete on the last half whorl.

The colour is white or cream, sometimes with two brown lines in the middle of the last whorl (Fig. 10A). Dimensions: Up to 5 mm in length.

Distribution. Throughout the Caribbean. Some references can not be included due to doubtful determination of the species.

Remarks. This is the older species in this group described from the Caribbean. The first problem is its generic placement. In a recent work by Fernández-Garcés & Rolán (2010) this species was referred to the genus *Pyrgocythara* Woodring, 1928. However this is open to discussion, as no more information on soft parts is available. In the present work we have decided to place it provisionally in *Agathotoma*, following most authors and databases.

We have had many doubts about the assignment of *A. candidissima* made by several authors, as for example Leal (1991: pl. 24A), and also García (2008: fig. 23) who reproduced the figure of the previous author. These figures presented a shell with the upper extreme of the axial ribs very prominent which is not in accordance with the figure of the type represented in Clench & Turner (1950); on the contrary these shells are more coincident with the morphology of the species we will mention below as *A. castellata*.

Pyrgocythara coxi Fargo, 1953 appears in Williams (2006) as a synonym of *A. candidissima*. We think that it is not, as the holotype of *A. coxi* shows axial ribs narrower than those on the typical *A. candidissima*.

In De Jong & Coomans (1988: figure 604A, p. 264) the shell presented as *A. candidissima* is not this species and the shell figured in fig. 604B is also dubious.

The shell figured here (Figures 1A, 10A) has the typical profile.

The species is correctly represented on some internet sites - (Conchologist Forum and Femorale, for example).

Agathotoma ecthymata García, 2008

Figs 2A-G, 10B-D, 11C, Table 1

Agathotoma ecthymata García, 2008. *Novapex*, 9(1): 3, figs. 10-18.

Type material. Holotype in ANSP (416412) (represented in the original description).

Type locality. Abaco, Bahama Islands.

Other material examined. Cuba: 4 s, Cañón de la Bahía, Cienfuegos, 12 m (CFG); 3 s, Los Laberintos, Cienfuegos, 20 m (CFG); 6 s, Rancho Luna, Cienfuegos, 24 m (CFG); 9 s, 2 j, Rancho Luna, Cienfuegos, 15 m (MHNS); 4 s, 3 j, Rancho Luna, Cienfuegos, 18 m (MHNS); 1 j, Cayo de Sancho Pardo, 12 m (MHNS); 1 s, Punta del Diablo, Gavilán, Cienfuegos, 21°57'796"N, 80°24'784"W, 20 m (MHNS); 11 s, 3 j, Bajo de Sancho Pardo, 15 m, (MHNS); 2 s, La Habana, 5 m (MHNS); 2 s, Itabo, Gavilán, Cienfuegos. 22°00'890"N, 80°24'832"W, 10 m (MHNS). Nicaragua: 4 s, 5 j, Cayo Witties, 12 m (MHNS). Mexico: 4 s, 2 j, Puerto Morelos, Yucatán, 12 m (MHNS). Bahamas: Abaco: 12 s, Treasure Cove, intertidal (CCR); 5s, 1 sp, Treasure Cay, 1 m (CCR); 4 s, Shell Island, Guana Cay, intertidal (CCR); 1 sp, Fish Cays, 3 m (CCR); 1 j sp, Guana Cay, 3.5 m (CCR); 2 sp, 1 j sp, Scotland Cay, 2.5 m (CCR); 1 sp, Don't Rock, 3.5 m (CCR).

Description. See García (2008). In the original description the protoconch is mentioned as having 1.5 whorls, but following the Verduin method (Verduin, 1976) which we usually employ, it has only a little

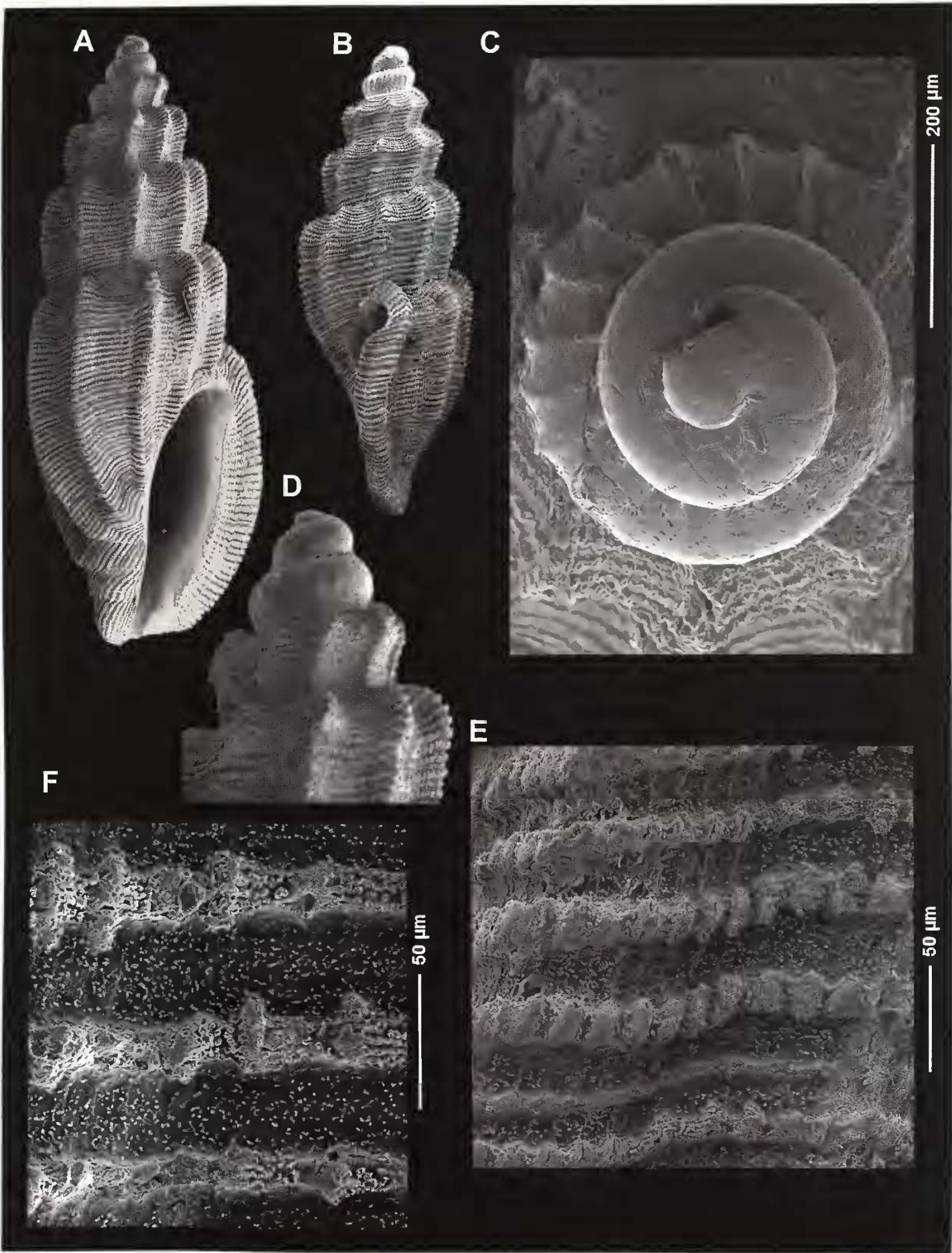


Figure 1. A-F. *Agathotoma candidissima* (C.B. Adams, 1845). **A.** shell, 4.7 mm, Faro de los Colorados, Cienfuegos, Cuba (MHNS); **B.** shell, 3.4 mm, María la Gorda, Cuba (MHNS); **C-D.** protoconch; **E-F.** microsculpture and detail.

more than one whorl and does not reach 1.25 whorls. Also García (2008) did not mention the dimensions of the protoconch, which we calculate to be between 320 to 340 μm in the figures. The protoconchs of our material are approximately 350-370 μm in diameter.

Distribution. In García (2008) it is recorded from: Bahamas, Belize, British Virgin Islands, Colombia. This is the first record for Cuban, Nicaraguan and Mexican waters.

Remarks. Most of our material is consistently smaller than the shell figured by García (2008), but the microsculpture of the protoconch and the teleoconch seems to be similar.

We show the microsculpture with better detail (Figs. 2F-G).

A. candidissima is more elongate, less robust, the shoulder is rounded and not so angular, and the protoconch has almost 2.25 whorls.

Agathotoma apocrypha (García, 2008)

Figs 3A-F, 11D, Table 1

Suturocythara apocrypha García, 2008. *Novapex*, 9(1): 3, figs. 33-36.

Type material. Holotype in ANSP (416415) (represented in the original description).

Type locality. Bahía de Campeche, SW Gulf of Mexico.

Other material examined. Cuba: 10 s, Faro Luna, Cienfuegos, 22 m (CFG); 1 s, Faro de los Colorados, 30 m (MHNS); 6 s, Rancho Luna, Cienfuegos (MHNS); 1 s, Bajo de Sancho Pardo, 12 m (MHNS); 1 s, Punta del Diablo, Gavilán, Cienfuegos, 21°57'796"N, 80°24'784"W, 20 m (MHNS). Mexico: 3 s, Puerto Morelos, Yucatán, 12 m (MHNS).

Description. See García (2008). The protoconch is mentioned in the original description as having 1.25 whorls, which agrees with our shells. In that work the dimensions of the protoconch were not mentioned, which we calculate to be about 470 μm in the figures. The protoconchs of our material are approximately 400-430 μm in diameter. Otherwise, the microsculpture seems to be similar, although the zigzag lines are not as well-defined as in our shells. The microsculpture of the teleoconch is shown in our plates.

Distribution. In the original description, García (2008) records this species from the southwestern Gulf of Mexico, the southeast coast of Florida and south of Belize. This is the first record for Cuban waters.

Remarks. In spite of the differences in the size of the protoconch and the microsculpture, we consider our material to be the same species. The shells are very similar to the type species of the genus, *Agathotoma angusta* (Jan) Bellardi, 1848 represented in Powell (1966: pl. 15, fig. 15), being even more similar to the type species than the shells of *Agathotoma candidissima*.

We figure with better detail the microsculpture of both the protoconch and the teleoconch in Figures 3E-F.

The species presented above are very different in profile and microsculpture, also with protoconch differences. The most similar protoconch is that of *Agathotoma ecthymata* but the microsculpture has minute tubercles aligned spirally.

Agathotoma castellata (E.A. Smith, 1888)

Figs 4A-G, 10E-F, 11E, Table 1

Pleurotoma (Mangilia) castellata E.A. Smith, 1888: 312-313.

Pyrgocythara candidissima in RIOS (1994): 175, fig. 806.

Type material. The lectotype of *A. castellata* is in BMNH (1854.6.30.136-7) and was designated by Kilburn (1993: fig. 71); also it was represented by KAICHER (1984), as *Agathotoma costellata* (sic), and in Williams (2006).

Type locality. Unknown.

Material studied. Cuba: 4 s, Faro de los Colorados, Cienfuegos, 20-35 m (MHNS); 5 s, 2 j, Rancho Luna, 20-35 m (MHNS); 5 s, Faro Luna, Cienfuegos, 22 m (CFG); 2 s, Los Laberintos, Faro Luna, Cienfuegos. 22°02'039"N, 80°25'792"W, 10 m (MHNS); 1 s, Comodoro Beach, 8-10 m (MHNS). Bahamas: Abaco: 17 s, Sandy Point, intertidal (CCR); 1 j, off Guana Cay, 60 m (CCR); 7 s, 2 j, off Chub Rocks, 23 m (CCR); 1 s, Sandy Cay, 7 m (CCR).

Description. Shell broadly ovoid, spire with turreted profile, solid, pointed, cream in colour with 4-5 irregular spiral brown bands sometimes faded partially or totally. Protoconch with 2.25 whorls, a diameter of about 500 μm , a nucleus of about 100 μm , 1.5 smooth whorls and the last $\frac{3}{4}$ bearing about 20 curved axial ribs. Teleoconch of about 3 - 4 whorls, all having a very prominent subsutural shoulder with the upper part of the whorls almost horizontal. Each whorl has about 7-8 almost orthocline or slightly opisthocline axial ribs, more prominent on the shoulder and much narrower than their interspaces. Spiral sculpture of very numerous and variable cordlets (about 14-16 on the first whorl), 20-22 on the second, 22-23 on the third and more than 60 on the body whorl, sometimes with intervening cordlets developing. Under high magnification the cordlets can be seen to be rugose, bearing numerous rounded rough nodules which

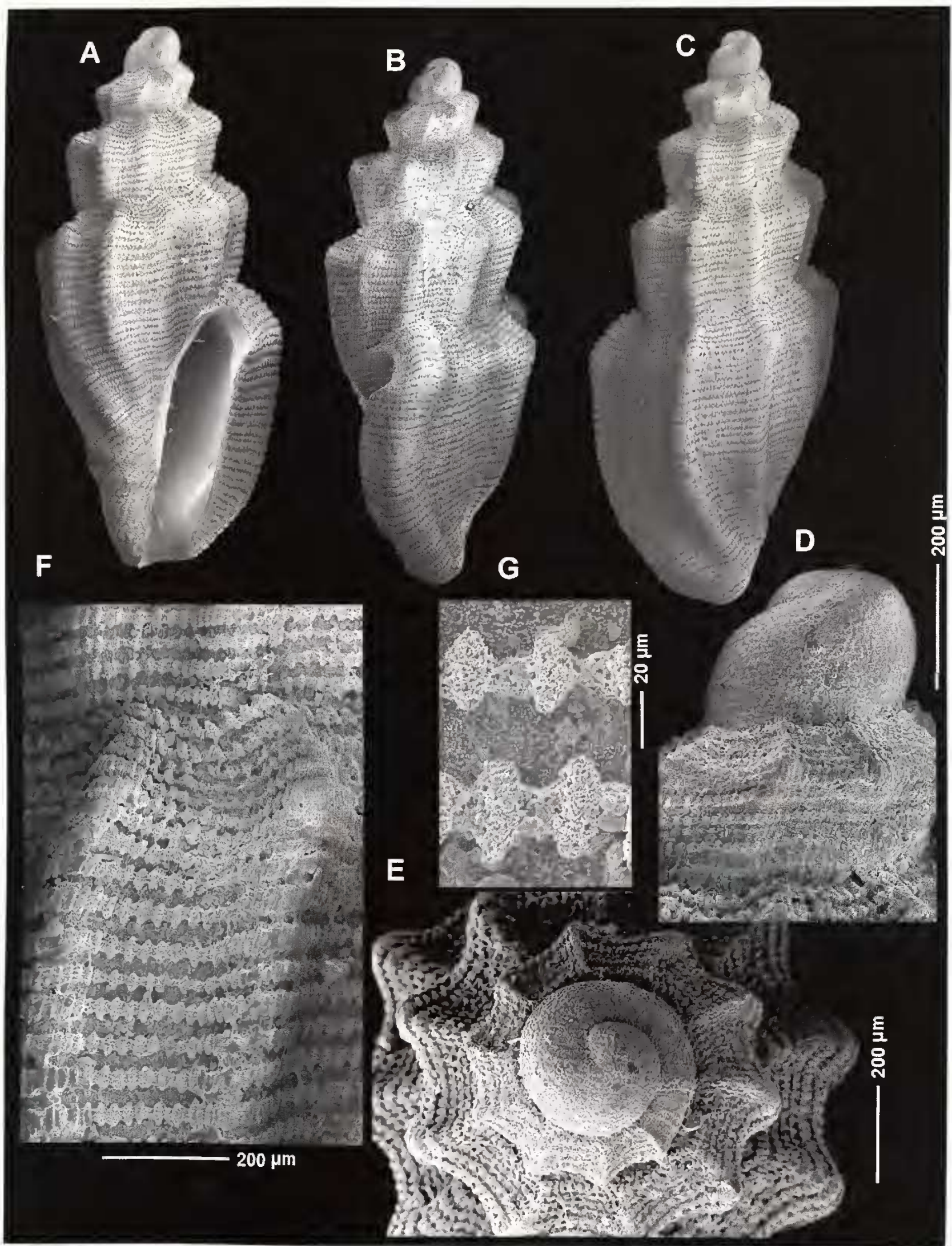


Figure 2. A-G. *Agathotoma ecthymata* García, 2008. A-C. shells, 3.0, 3.1, 3.4 mm, Los Laberintos, Cienfuegos (MHNS). D-E. protoconch. F-G. microsculpture and detail.

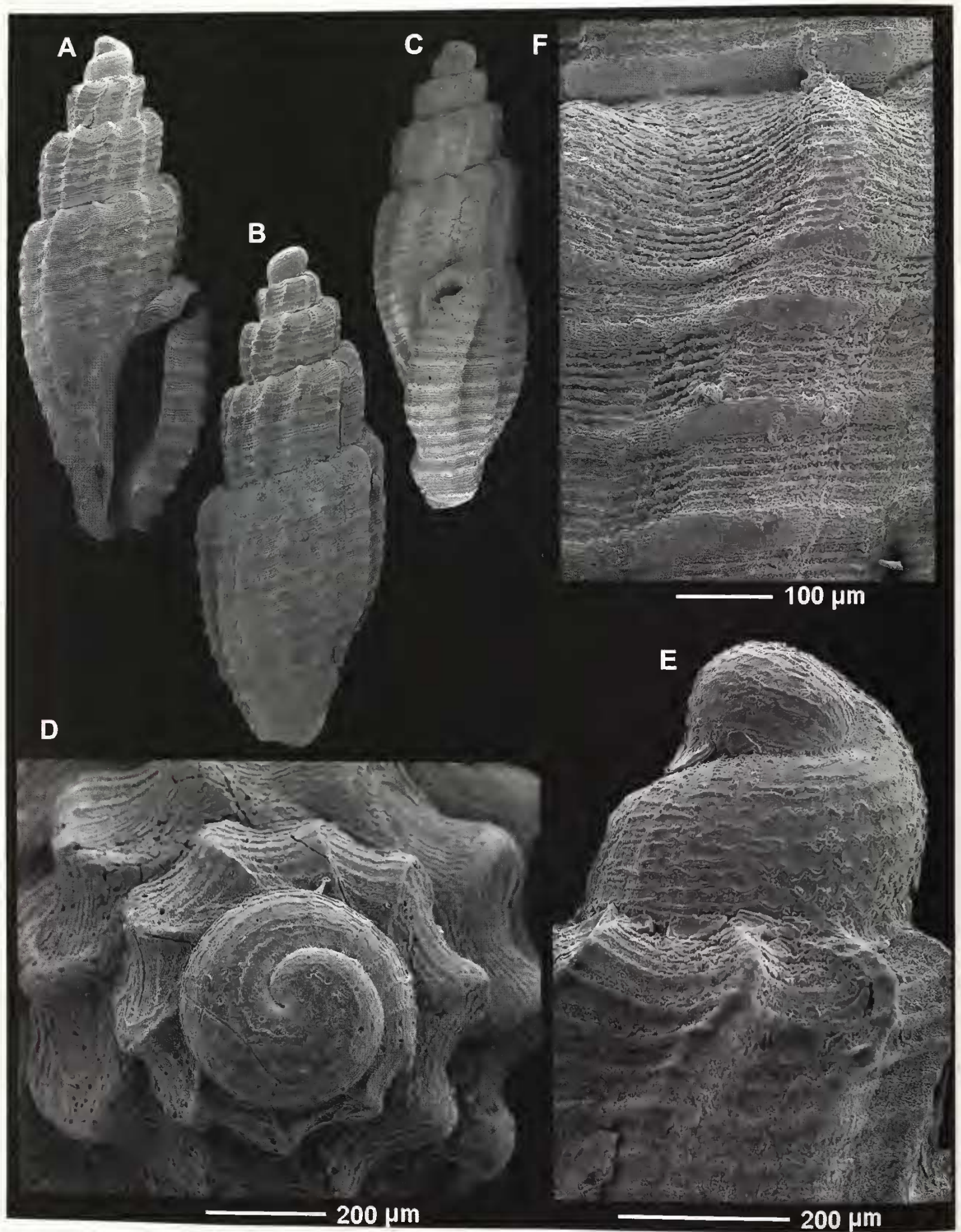


Figure 3. A-F. *Agathotoma apocrypha* (García, 2008). A-C. shells, 3.8, 3.7, 3.5 mm, Cienfuegos (MHNS); D-E. protoconchs; F. microsculpture.

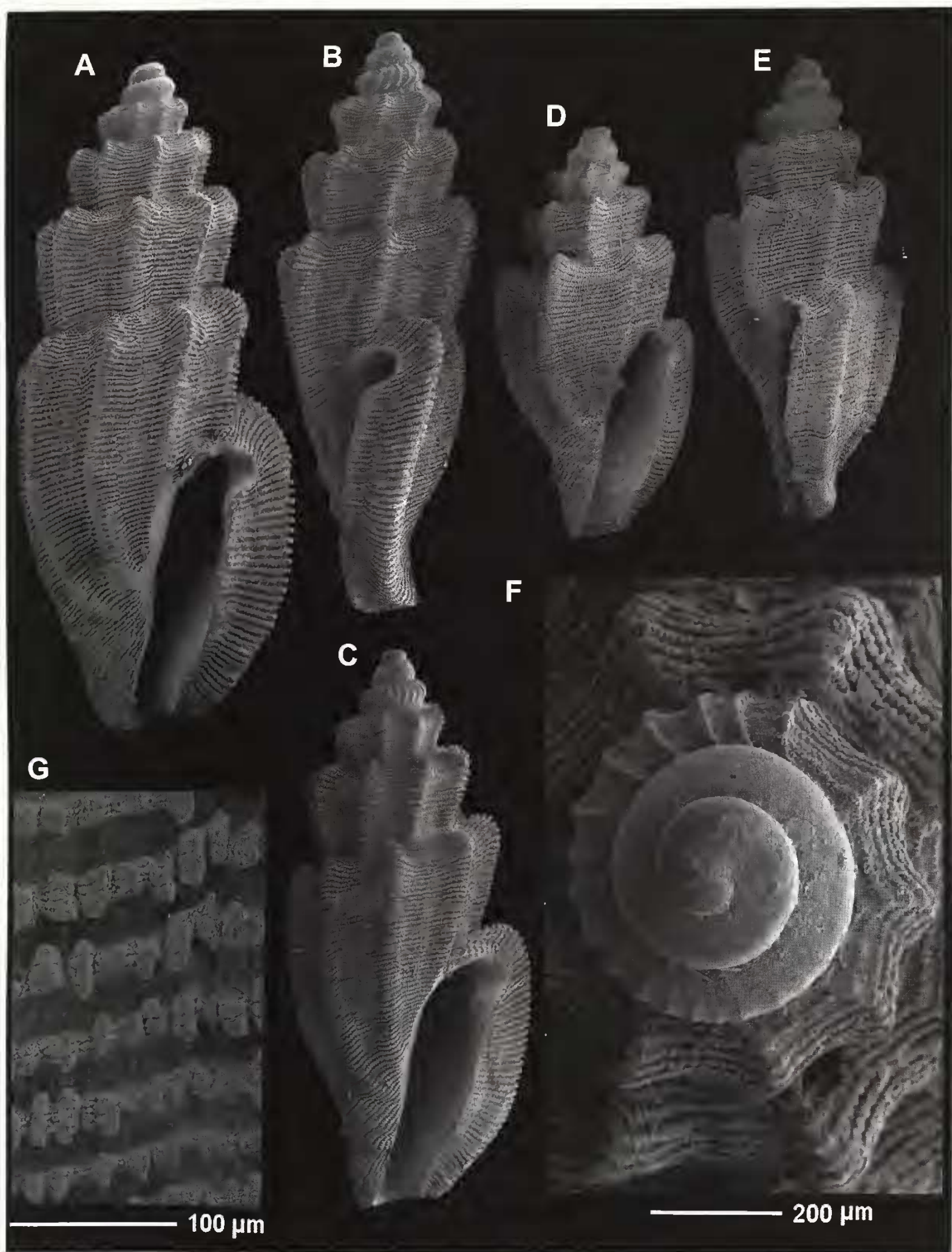


Figure 4. A-G. *Agathotoma castellata* (E.A. Smith, 1888). **A.** shell, 5.2 mm, Abaco, Bahamas (CCR); **B-C.** 3.9, 4.0 mm, Faro de los Colorados (MHNS); **D-E.** juvenile, 2.6, 3.2 mm, Rancho Luna (MHNS); **F.** protoconch; **G.** microsculpture.

overlap the interspaces; in the interspaces there are numerous irregular minute microtubercles. Aperture elongate-oval, extended by a wide and short siphonal canal; on the upper part a relatively deep sinus, with a tubercle on its lower edge. Microsculpture of the shell extends onto a wide thickened peristome.

Dimensions: The lectotype is 6.5 mm in length. The material studied from Cuba and Bahamas is smaller.

Distribution. This species has been recorded from the Caribbean (Rosenberg, 2009) and from Cuba in the present work. It was also recorded (as *A. candidissima*) from the Bahamas (Redfern, 2001: fig. 537A) and Brazil (Leal, 1991: pl. 24, fig. A), with the latter figure reproduced by Rios (1994: 175, fig. 806) and García (2008: fig. 23).

Remarks. It is evident that this species is rather variable:

- 1- The axial ribs of the lectotype of *A. castellata* are very narrow (interspaces 4-5 times wider) while in most of our shells the interspaces are only 2-3 times wider.
- 2- Usually the ribs extend above the level of the suture, a feature which is more evident in juvenile shells.
- 3- The lectotype of *A. castellata* measures 6.5 mm in length for a shell with 4 teleoconch whorls, while we have shells with the same number of whorls and a length of only 4-5 mm.
- 4- The siphonal canal of *A. castellata* is relatively shorter in larger shells.

With regard to the confusion of the present species with *A. candidissima*, we must point out that the latter is narrower, more elongate, the rounded upper part of the axial ribs is less pronounced, the axial ribs never extend above the sutural level and the colour is whitish with narrow brown bands.

Both species are present in Cuba and we have never found any intergradations between them, and so we consider them to be different species.

***Agathotoma kirshi* spec. nov.**

Figs 5A-H, 11F, Table 1

Type material. Holotype (Figs. 5A-D) deposited in BMSM (17948) (Ex-CCR 10498). Paratypes: CDK (1 s) (Fig. 5E), Pelican Point, North Caicos, intertidal; MNHN (24829, 1 s) (Fig. 5F), from Sandy Cay, Abaco, Bahamas, 7 m.

Type locality. Chub Rocks, Abaco, Bahamas, under a rock, 12 m.

Other material examined. Nicaragua: 1 s, 1 f, Cayo Witties, 20 m (MHNS).

Description. Shell with ovoid elongate profile, slightly turreted, rather solid, pointed, white in colour with 2 spiral bands formed by isolated brown blotches, mainly evident on the ribs. Protoconch with only a little more than 1 whorl, with a diameter of about 480 µm, being totally covered by very small rounded tubercles spirally aligned. Teleoconch of about 5-5.5 whorls, with a rounded shoulder close to the upper suture. Each whorl has about 7 almost orthocline or slightly opisthocline ribs, more prominent on the shoulder and narrower than their interspaces. On the last ½ whorl, the axial ribs may be absent. Spiral sculpture of very numerous and variable cordlets (between 15-20 on the first whorl), with additional intervening ones developing, numbering about 24 on the second, 27 on the third and more than 70 on the body whorl. Under high magnification the cordlets can be seen to be rugose, bearing numerous rounded rough nodules that are axially elongate and overlap the interspaces; in the interspaces there are numerous irregular minute microtubercles. Aperture oval elongate, extended by a wide and short siphonal canal; on the upper part a shallow sinus. Peristome wide, with the same microsculpture as the shell.

Dimensions: The holotype is 8 mm in length.

The soft parts examined in a specimen from Abaco (Bahamas) (Figs. 5 B-D) are whitish and slightly translucent, with a few milk-white spots at the end of the siphon and with the eyes very close to the end of the tentacles.

Distribution. Known from the Bahama Islands and Turks and Caicos Islands. A shell from Nicaragua is probably this species, but is not in good enough condition for a definitive comparison.

Remarks. *Agathotoma kirshi* spec. nov. is the largest of the species studied in the present work. Axial ribs may be obsolete on the last whorl. The persistence of a previous apertural thickening seems to be frequent.

Agathotoma candidissima is smaller, shorter, without former varices, the protoconch has more whorls, the colour is whitish.

Agathotoma ecthymata is more robust, the shoulder is more prominent, the axial ribs wider, the last whorl straighter towards the base, the protoconch is narrower and less elevated.

Agathotoma apocrypha is smaller, the axial ribs more numerous and wider, the microsculpture has cords alternating with cordlets, the protoconch has zigzag lines.

Agathotoma castellata is smaller, relatively wider, with the axial ribs prominent and surpassing the level of the suture; the protoconch has 2.5 whorls.

Etymology. Named after David Kirsh, who collected the shell from North Caicos and loaned it to us for study.

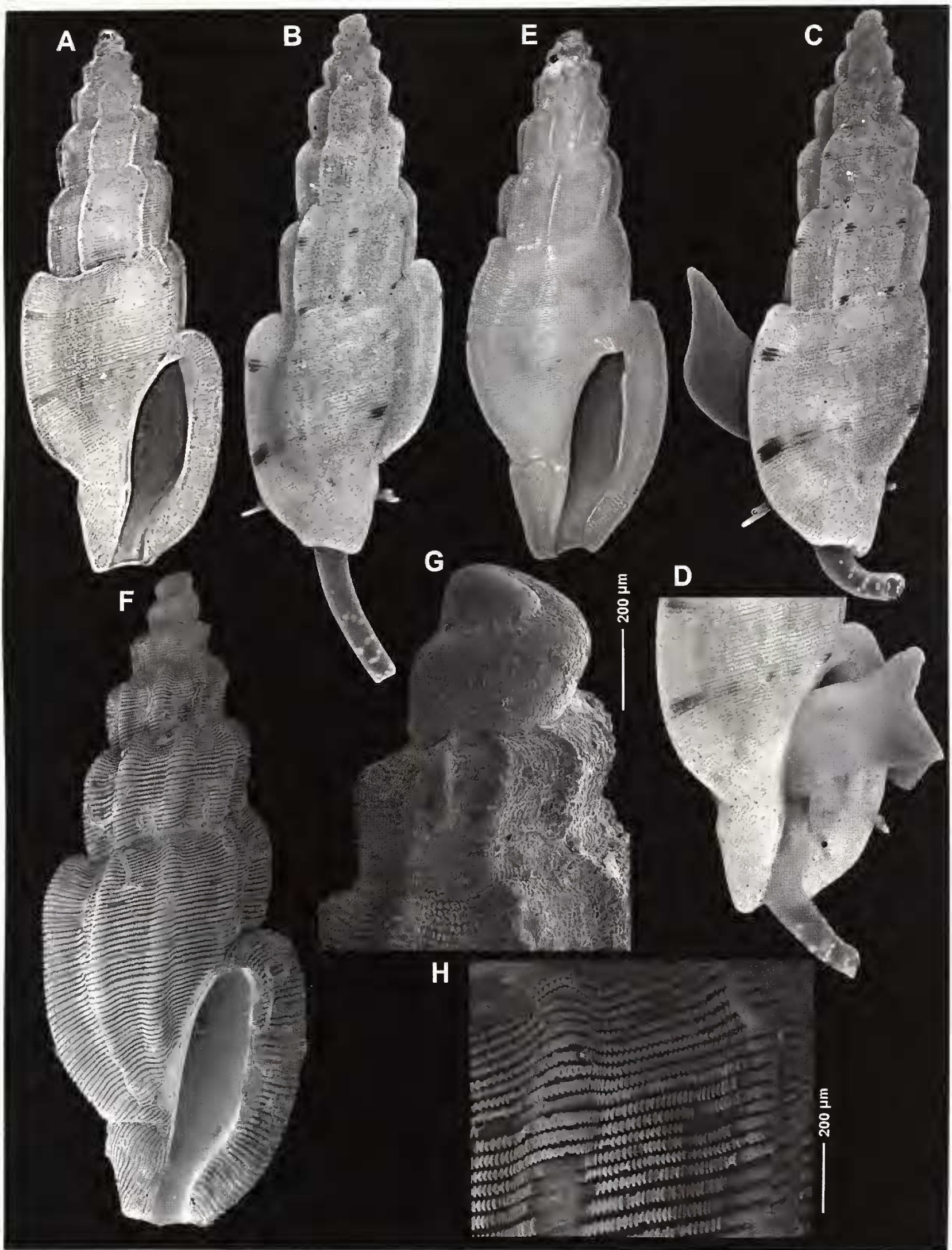


Figure 5. A-H. *Agathotoma kirshi* spec. nov. **A-D.** holotype, 8 mm (BMSM); **A.** shell; **B-D.** holotype with soft parts; **E.** paratype, 9 mm, North Caicos (CDK); **F.** paratype, 7 mm, Sandy Cay, Abaco, Bahamas (MNHN); **G.** protoconch, from figure F; **H.** microsculpture.

Agathotoma asthenika spec. nov.
Figs 6A-E, 10G, 10K-L, 11G, Table 1

Type material. Holotype (Fig. 6A) in the MNCN (15.05/60008). Paratypes in the following: MNHN (24830, 1 s); from the type locality; MHNS (100567, 1 s), IES (1 s); CFG (1 s) and CCR (1 s), both from Faro de los Colorados, Cienfuegos, 40-65 m; USNM (1 s), La Habana, 12 m.

Other material examined. Cuba: 1 s, Rancho Luna, 22 m, broken during the study; 3 s, Los Laberintos, Faro Luna, Cienfuegos 22 m (CFG); 5 s, Los Laberintos, Faro Luna, Cienfuegos, 22°02'039"N, 80°25'792"W, 10 m (CFG); 4 s, 1j, Bajo de Sancho Pardo, 15 m (MHNS).

Type locality. Los Laberintos, Faro Luna, Cienfuegos, 30 m, Cuba.

Description. Shell ovoid-elongate, rather solid, pointed, white with some tan areas between the ribs and also in the sutural area. Protoconch of a little more than 2 whorls, the first one and a quarter whorls smooth and the last half axially ribbed. Diameter of about 410 µm. Teleoconch of about 4 whorls, with a slightly prominent shoulder a short distance below the suture. Each whorl has 8-9 prominent orthocline or slightly opisthocline ribs, a little prominent on the shoulder and narrower than their interspaces. Spiral sculpture of very numerous and irregular cordlets (about 10 on the first whorl, about 11-12 on the second and 40 to 55 on the body whorl). High magnification reveals very fine lines in the interspaces which form axially elongate nodules when crossing the cordlets. In the interspaces there are also numerous irregular micro-tubercles. Aperture oval elongate extended by a wide and short siphonal canal and with a deep sinus on its upper part. Peristome wide, with the same microsculpture as the shell.

Dimensions: The holotype is 3.9 mm in length. Other material studied is between 3-4 mm in length.

Distribution. Only known from Cuba.

Remarks. *A. candidissima* is larger, a little wider, more solid, the shoulder is less pronounced and rounded, the colour is white sometimes with faded spiral bands and lacks subsutural colour. *A. candidissima* is a slightly variable species, but it is not possible that these shells could represent a population of narrow shells because typical shells of both species have been collected in the same area without intergradations.

Agathotoma ecthymata is wider and more robust, and has a paucispiral protoconch.

Agathotoma apocrypha is wider, mainly on the base, the spiral sculpture has larger cordlets and the protoconch is short and strongly sculptured by zigzag cords.

Agathotoma castellata is wider, with axial ribs which are more elevated in the subsutural area.

Etymology. The specific name is derived from the Greek word "*asthenikós*" which means "thin, sickly" alluding to its narrow profile.

Agathotoma eduardoi spec. nov.
Figs 7A-G, 10H, 10M-N, 11H, Table 1

Type material. Holotype (Fig. 7A) in the MNCN (15.05/60009). Paratypes in the following: MNHN (24831, 1 s, Fig. 7B, 11D); MHNS (100568, 5 s, Fig. 7C, 11C), IES (1 s); CFG (1 s) all paratypes from Rancho Luna, Cuba.

Other material examined. Cuba: 2 s, Itabo, Gavilán, Cienfuegos, 22°00'890"N, 80°24'832"W, 10 m (MHNS); 1 s, Rancho Luna, Cienfuegos 20 m (CFG).

Type locality. Cayo Witties, 12 m, Nicaragua.

Description. Shell ovoid-elongate, rather solid, pointed, whitish in colour. Protoconch with a little more than one whorl, appearing smooth, but magnification reveals numerous spirally aligned tubercles; diameter of about 380-400 µm. Teleoconch of about 4 whorls in most mature specimens, with a slightly prominent shoulder a short distance below the suture. Each whorl has prominent orthocline or slightly opisthocline ribs, nine on the first whorl and about ten on the subsequent whorls, the ribs being narrower than their interspaces. Spiral sculpture of very numerous and irregular cordlets (about 10 on the first whorl, about 14 on the second and between 45-50 on the body whorl). High magnification reveals very fine lines in the interspaces which form axially elongate nodules when crossing the cordlets, with an irregular microsculpture. In the interspaces there are also numerous irregular micro-tubercles. Aperture oval elongate extended by a wide and short siphonal canal and with a deep sinus on its upper part. Peristome wide, with the same microsculpture as the shell.

Dimensions: The holotype is 4.2 mm in length. Other material studied is between 2-4 mm in length.

Distribution. Known from Cuba and Nicaragua.

Remarks. The differences with the species previously mentioned are very similar to those discussed for *A. asthenika* spec. nov., as both shells are very similar except for the different shorter protoconch.

Agathotoma candidissima is larger, a little wider, more solid, the shoulder is less pronounced and rounded, the colour is white sometimes with faded spiral bands, lacks subsutural color, and has a protoconch with more whorls.

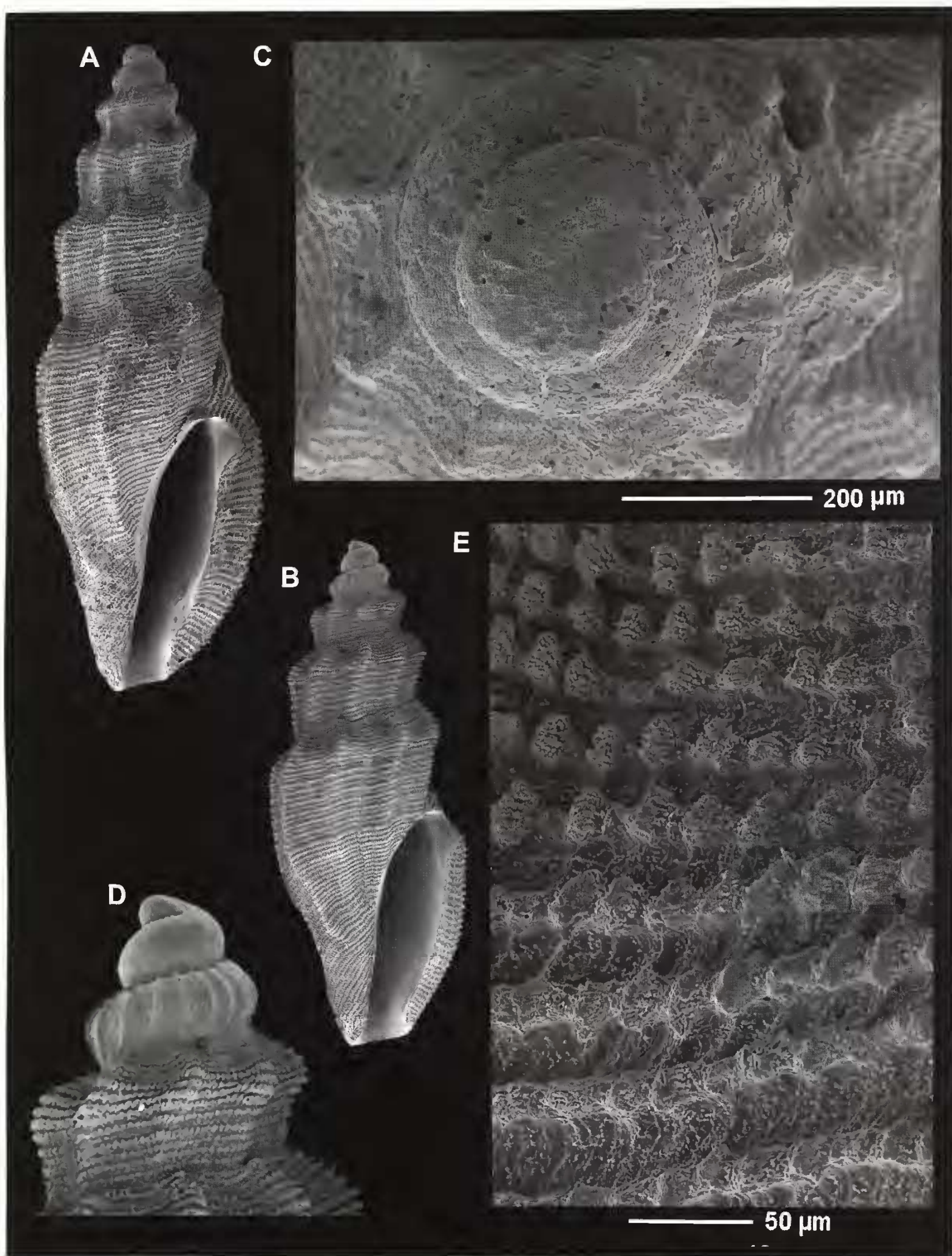


Figure 6. A-E. *Agathotoma asthenika* spec. nov. A. holotype, 3.9 mm, Los Laberintos, Faro Luna (MNCN); B. juvenile, 3.0 mm, Maria la Gorda (MHNS); C-D. protoconch; E. microsculpture.

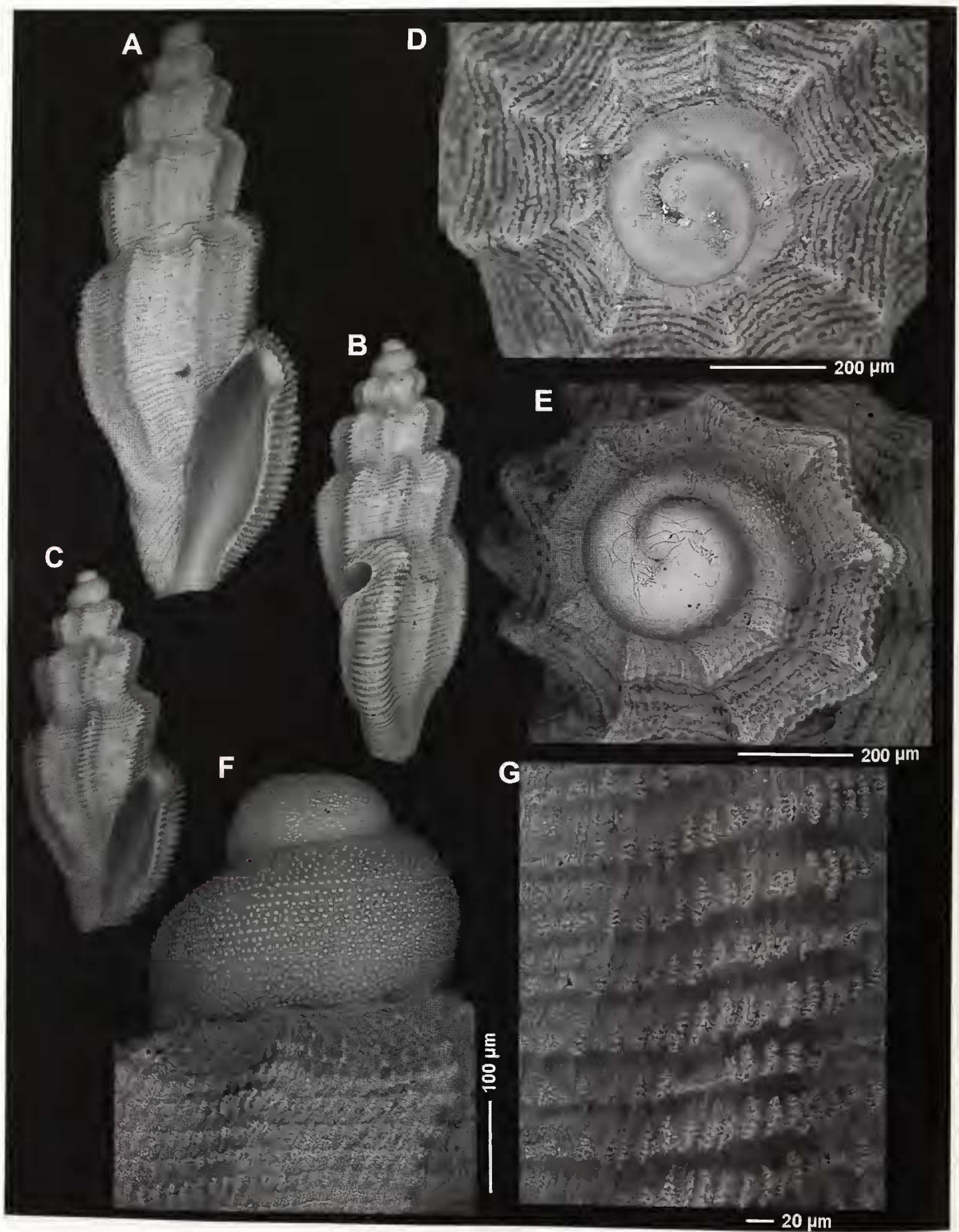


Figure 7. A-G. *Agathotoma eduardoi* spec. nov. A. holotype, 4.2 mm, Cayo Witties, Nicaragua (MNCN); B-C. paratypes, 3.7 mm (MNHN), 3.3 mm (MHNS), from Rancho Luna, 10-30 m; D. protoconch, from Witties, Nicaragua; E-F. protoconchs from Rancho Luna, Cuba. G. microsculpture.

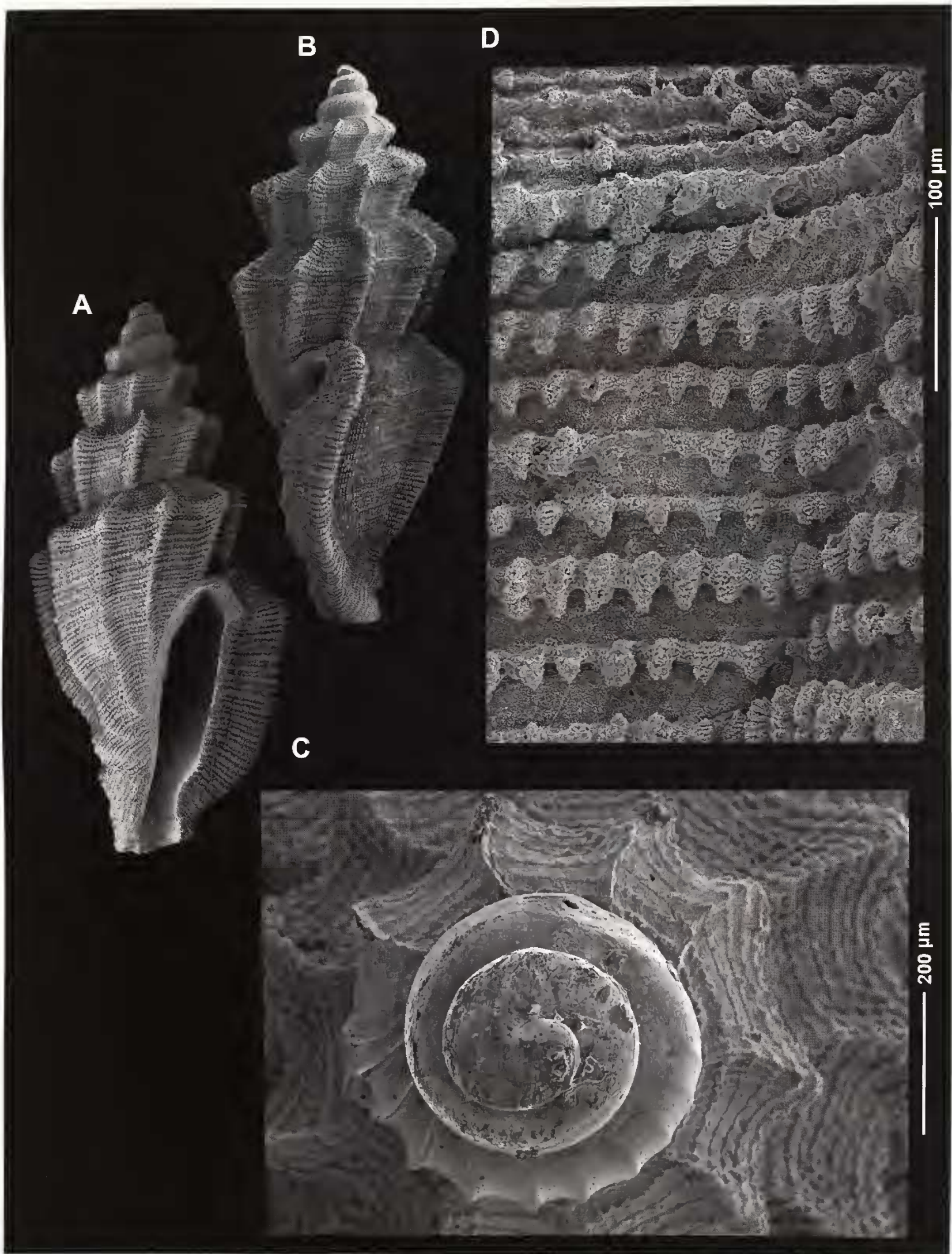


Figure 8. A-D. *Agathotoma prominens* spec. nov. A. holotype, 4.1 mm, (MNCN); B. paratype, 4.3 mm (MNHN), Faro de los Colorados; C. protoconch; D. microsculpture.

Agathotoma ecthymata is wider and more robust, the shoulder more angular, and its protoconch is rather similar but a little narrower and its tubercles are more dense.

Agathotoma apocrypha is wider, mainly on the base, the spiral sculpture has larger cordlets and the protoconch is sculptured by zigzag cords.

Agathotoma castellata is wider, with axial ribs which are more elevated in the subsutural area and the protoconch has more whorls.

Agathotoma kirshi spec. nov. has a larger shell, wider and more sculptured, and the axial ribs do not have a clear shoulder.

Agathotoma asthenika spec. nov. has a rather similar shell, but it has a very different protoconch with a little more than 2 whorls, the first one smooth.

Etymology. The specific name honours Eduardo Nápoles Fernández, grandson of the second author.

Agathotoma prominens spec. nov.

Figs 8A-D, 10I-J, 11I, Table 1

Type material. Holotype (Fig. 8A, 10I), in MNCN (15.05/60010); Paratypes: MNHN (24832, 1 s, Fig. 8B, 10J), MHNS (100569, 3 s), IES (2 s), USNM (1 s), CFG (2 s), all from the type locality; CFG (3 s) Cañón de la bahía de Cienfuegos, 12 m; (2 s), Faro Luna, 20 m; CCR (1 s), Bajo de Sancho Pardo, 15 m; MHNS (100569, 2 s), from Cayo María la Gorda, 12 m; (100569, 1 s), Cayo Witties, 12 m, Nicaragua.

Type locality. Faro de los Colorados, Cienfuegos, 20 m, Cuba.

Other material examined. Cuba: 2 s, 1 j, Itabo, Gavilán, Cienfuegos. 22°00'890"N, 80°24'832"W, 10 m (MHNS); 1 s, 5 f, Rancho Luna, Cienfuegos, 10-20 m (MHNS). Nicaragua: 1 f, Cayo Witties, 12 m. Bahamas: Abaco: 1 s, Sandy Cay, 7m.

Description. Shell with rhomboidal profile, solid, pointed, cream with three irregular spiral brown bands.

Protoconch with 2.25 whorls, a diameter of about 510 µm, a nucleus of about 100 µm, the last ½ whorl with 11 curved axial ribs, the rest being smooth. Teleoconch of about 3.5 whorls, which have a prominent and angular shoulder just below the suture. Each whorl has prominent, almost orthocline ribs, prominent on the shoulder and narrower than their interspaces. Spiral sculpture of numerous and variable cordlets (about 15 on the first and more than 60 on the body whorl). High magnification shows the cordlets to be rugose, bearing numerous axially elongate nodules which mainly overlap the interspace below. Interspaces sometimes with fine growth lines and numerous irregular minute micro-tubercles. Aperture oval elongate, extended by a short siphonal canal that

is wide at the base but constricted above; also with a deep sinus on the upper part. Peristome wide, with the same microsculpture as the shell.

Dimensions: The holotype is 4.1 mm in length. One paratype reaches 5.2 mm in length.

Distribution. Only known from Cuba, Nicaragua and the Bahamas.

Remarks. Comparison may be made with the following species:

Agathotoma candidissima is usually larger, a little wider, more rounded in profile, the shoulder is less pronounced and not angular, the colour is white sometimes with faded spiral bands.

Agathotoma ecthymata is wider at the base, more robust, the ribs are a little prominent but less angular, and has a paucispiral protoconch.

Agathotoma apocrypha is narrower, wider at the base, the shoulder less prominent and the spiral sculpture has larger cordlets; the protoconch is short and strongly sculptured by zigzag cords.

Agathotoma castellata is usually smaller, narrower, the shoulder is less prominent and the ribs are more elevated; the colour does not form spiral bands.

We include images (Figs. 9A-B, 10O) of *Glyphoturris rugirima* (Dall, 1889) with a detail of the microsculpture (Fig. 9C). It can appear similar to the species here described, but differs due to its very irregular and prominent spiral cords.

Etymology. The specific name is derived from the Latin word "*prominens*", prominent, alluding to the projecting angulation on the axial ribs.

Agathotoma sp.

Fig 10 P-Q

Remarks. Also we found a large shell that is apparently different from all those previously studied, but it could be a gerontic form of *A. candidissima*. We wait for more material in order to reach a conclusion.

CONCLUSION

The Caribbean is an area very rich in biodiversity. It is expected that more species from many groups will be described in the future. In the group that we have examined in the present work the profile of the shells, in particular the shape of the upper part of the ribs, was considered to be very important and was consistent in many samples.

For comparison, we show in Figure 11 how the different profile of the shells depends on the shape of the upper part of the axial ribs below the suture.

As a separation for the species mentioned in the present work we add a Dichotomous Key on the basis of the most important differences.

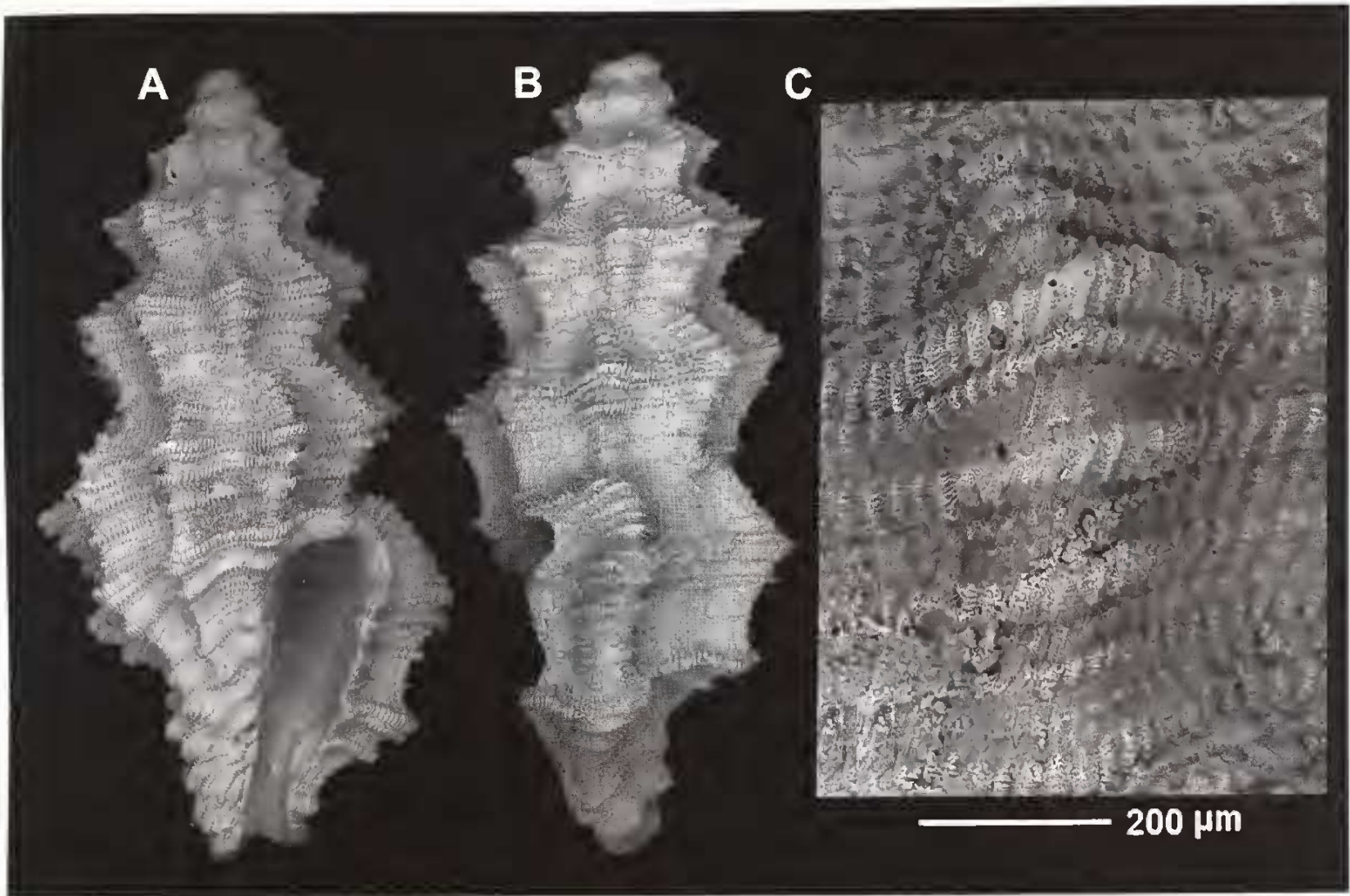


Figure 9. A-C. *Glyphoturris rugirima* (Dall, 1889). A-B. shell, 5.0, 4.8 mm, Rancho Luna, 10-30 m (MHNS); C. microsculpture.

Dichotomous key for the species of *Agathotoma* in the present work

- | | |
|--|---------------------|
| 1 -Protoconch with only 1-1.3 whorls..... | 2 |
| -Protoconch with at least 2 whorls | 5 |
| 2 -Microsculpture of the protoconch with zigzag lines..... | <i>apocrypha</i> |
| -Microsculpture of the protoconch with tubercles..... | 3 |
| 3 -Protoconch with cylindrical profile | <i>kirshi</i> |
| -Protoconch with rounded dome profile..... | 4 |
| 4 -Protoconch with dense microsculpture of tubercles | <i>ecthymata</i> |
| -Protoconch with microsculpture of tubercles in lines..... | <i>eduardoi</i> |
| 5 -Axial ribs with pronounced angulation a short distance below suture | 6 |
| -Upper part of axial ribs rounded near suture..... | 7 |
| 6 - The angulation is < 90° on first whorl and around 90° on the following ones | <i>prominens</i> |
| - the angulation is about 90° on first teleoconch whorl and > 90° on the following..... | <i>asthenika</i> |
| 7 - Axial ribs elevated subsuturally but not surpassing level of suture; the profile of the ribs is vertical | <i>candidissima</i> |
| - Upper curvature of axial ribs frequently surpassing level of suture; the profile of the ribs is inclined | <i>castellata</i> |

Table 1

	protoconch whorls	protoconch microsculpture	protoconch diameter inµm	upper part of ribs	height/width ratio
<i>A. candidissima</i>	2-2.3	smooth+axial	about 400	rounded	2.6
<i>A. ecthymata</i>	1-1.3	dense tubercles	350-370	lower angulation	2.2
<i>A. apocrypha</i>	1-1.3	zigzag lines	400-430	rounded	2.6
<i>A. castellata</i>	2-2.3	smooth+axial	about 500	rounded high	2.3
<i>A. kirshi</i>	1-1.3	aligned tubercles	about 480	slightly rounded	2.4-2.7
<i>A. asthenika</i>	2-2.3	smooth+axial	about 410	lower angulation	2.8
<i>A. eduardoi</i>	1-1.3	aligned tubercles	380-400	rounded	2.6
<i>A. prominens</i>	2-2.3	smooth+axial	about 510	sharp angulation	2.1

ACKNOWLEDGEMENTS

The authors thank the persons who have read this manuscript and have given us their opinions, allowing us to make corrections. Jesús Méndez and Inés Pazos made the SEM photos in the Centro de Apoyo Científico y Tecnológico a la Investigación (CACTI) of the University of Vigo. The optical photographs were made in the Departamento de Xenética of the same University.

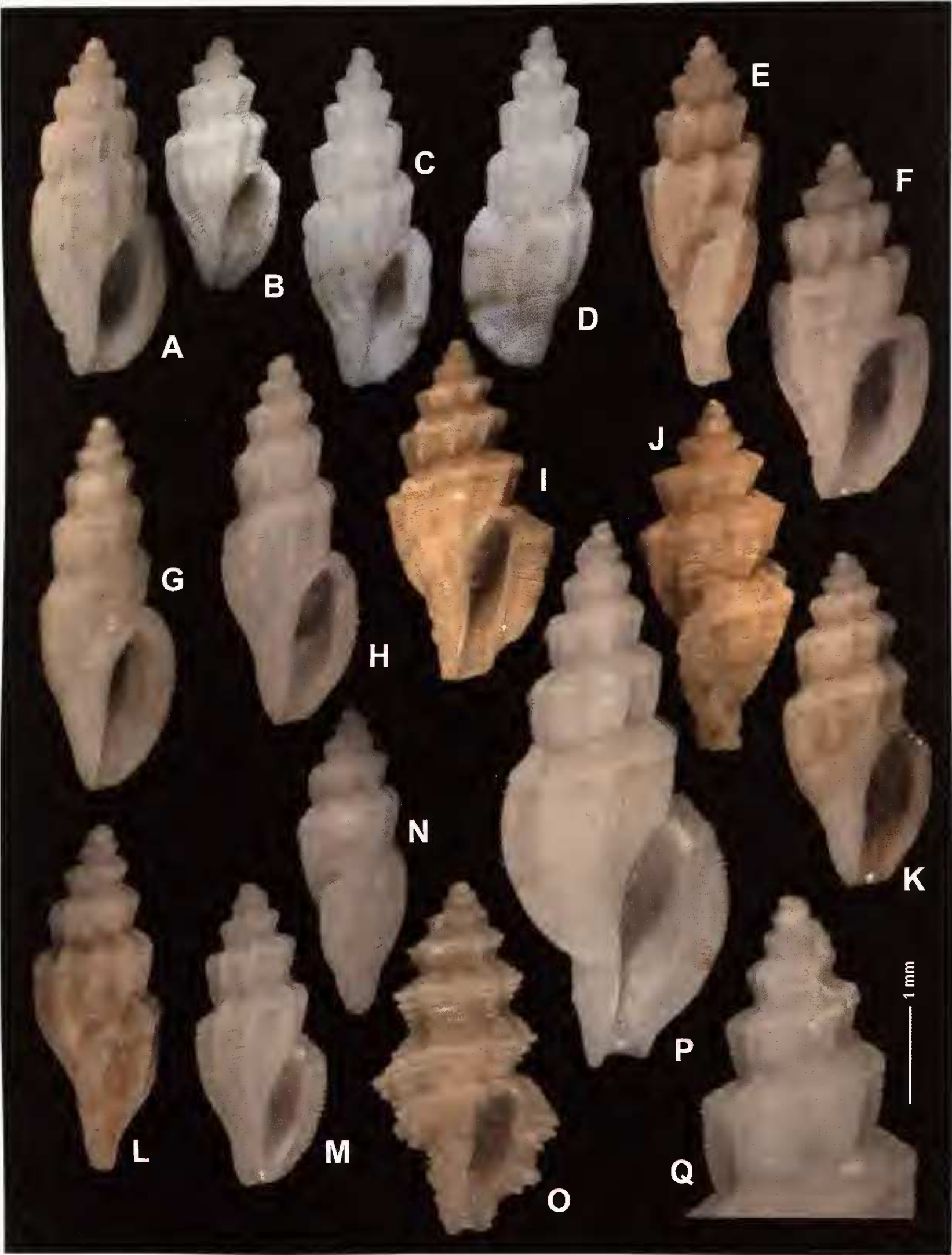
REFERENCES

Clench, W.J. & Turner, R.D. 1950. The Western Atlantic Marine Mollusks described by C.B. Adams *Occasional Papers On Mollusks*, 1(15): 233-403.

Conchologist forum:

http://z14.invisionfree.com/Conchologist_Forum/ar/t586.htm (accessed Dec. 2011)
De Jong, K. M. & Coomans, H. E. 1988. *Marine gastropods from Curaçao, Aruba and Bonaire*. E. J. Brill, Leiden, 261 pp.
Femorale:
[http://www.femorale.com.br/shellphotos/detail.asp?species=Agathotoma+cf.+candidissima+\(C.B.Adams%2C+1845\)](http://www.femorale.com.br/shellphotos/detail.asp?species=Agathotoma+cf.+candidissima+(C.B.Adams%2C+1845)) (accessed Dec. 2011)
Fernández-Garcés, R. & Rolán, E. 2010. Two new species of the genus *Pyrgocythara* (Gastropoda, Conidae) from Cuba. *Gloria Maris*, 49(3-4): 68-77.

Figure 10. A-Q. Colour figures of *Agathotoma*. **A.** *Agathotoma candidissima* (C. B. Adams, 1845) 4.7 mm, Faro de los Colorados, Cuba (MHNS). **B-D.** *Agathotoma ecthymata* García, 2008; **B.** 3.7 mm, Rancho Luna (MHNS); **C-D.** 5.1 mm, Faro de los Colorados (MHNS). **E-F.** *Agathotoma castellata* (E.A. Smith, 1888), shells, 4.0, 3.9 mm (MHNS) (both represented in Figs. 4B-C). **G.** *Agathotoma asthenika* spec. nov., holotype, 3.9 mm (MNCN) (figured in Fig. 6A). **H.** *Agathotoma eduardoi* spec. nov., holotype, 4.2 mm (MNCN) (figured in Fig. 7A). **I-J.** *Agathotoma prominens* spec. nov.; **I.** holotype, 4.1 mm (MNCN); **J.** paratype, 4.3 mm (MNHN) (both figured in Fig. 8A-B). **K-L.** *Agathotoma asthenika* spec. nov., 3.4 mm, María la Gorda (MHNS) (shell figured in Fig. 6B). **M-N.** *Agathotoma eduardoi* spec. nov.; **M.** paratype, 3.3 mm (MHNS); **N.** paratype, 3.7 mm (MNHN) (both have been figured in Figs. 7B-C). **O.** *Glyphoturris rugirima* (Dall, 1889), 5 mm, Rancho Luna, 10-30 m (MHNS); **P-Q.** *Agathotoma* sp. 8.4 mm, Rancho Luna, 10-20 m (MHNS).



- García, E.F. 2008. Eight new molluscan species (Gastropoda: Turridae) from the western Atlantic, with the description of two new genera. *Novapex*, 9(1): 1-15.
- Kaicher, S. D. 1984. Card Catalogue of World-wide Shells. Pack 39. Turridae I.
- Kilburn, R. N. 1993. Turridae (Mollusca: Gastropoda) of southern Africa and Mozambique. Part 6. Subfamily Mangeliinae, section 2. *Annals of the Natal Museum*, 34(2): 317-367.
- Leal, J.H., 1991. *Marine Prosobranch Gastropods from Oceanic Islands off Brazil*. W. Backhuys, Oegstgeest. 419 pp.
- Powell, A.W.B. 1966. The molluscan families Speightiidae and Turridae. An evaluation of the valid taxa, both Recent and fossil, with lists of characteristic species. *Bulletin of the Auckland Institute and Museum*, 5: 1-184; 23 pls.
- Redfern, C. 2001. *Bahamian Seashells. A thousand species from Abaco, Bahamas*. Bahamianseashells.com, Boca Raton, 280 pp.
- Rios, E. 1994. *Seashells of Brazil. 2nd Edition*. Museo Oceanográfico, Fundação Universidade do Rio Grande: Rio Grande. 368 pp.
- Rolán, E. & Otero-Schmitt, J. 1999. The family Turridae s. l. (Molluscs, Neogastropoda) in Angola. 2. Subfamily Mangeliinae Fischer, 1883. *Argonauta*, 13(1): 5-26.
- Rosenberg, G. 2009. Malacolog 4.1.1: A Database of Western Atlantic Marine Mollusca. [WWW database (version 4.1.1)] URL <http://www.malacolog.org/>.
- Smith, E.A. 1888. Diagnoses of new species of Pleurotomidae in the British Museum. *Annals and Magazine of Natural History*, 6(2): 300-317.
- Verduin, A. 1976. On characters, variability, and distribution of the European marine gastropods *Bittium latreillii* (Payraudeau) and *Bittium lacteum* (Philippi). *Basteria*, 40: 133-142.
- Warmke, G. L. & Abbott, R. T. 1961. *Caribbean Seashells*. Livingston Publishing Company: Wynnewood, PA. 348 pp.
- Williams, M. 2006. Shallow water Turridae of Florida and the Caribbean. Published privately. Not paginated.

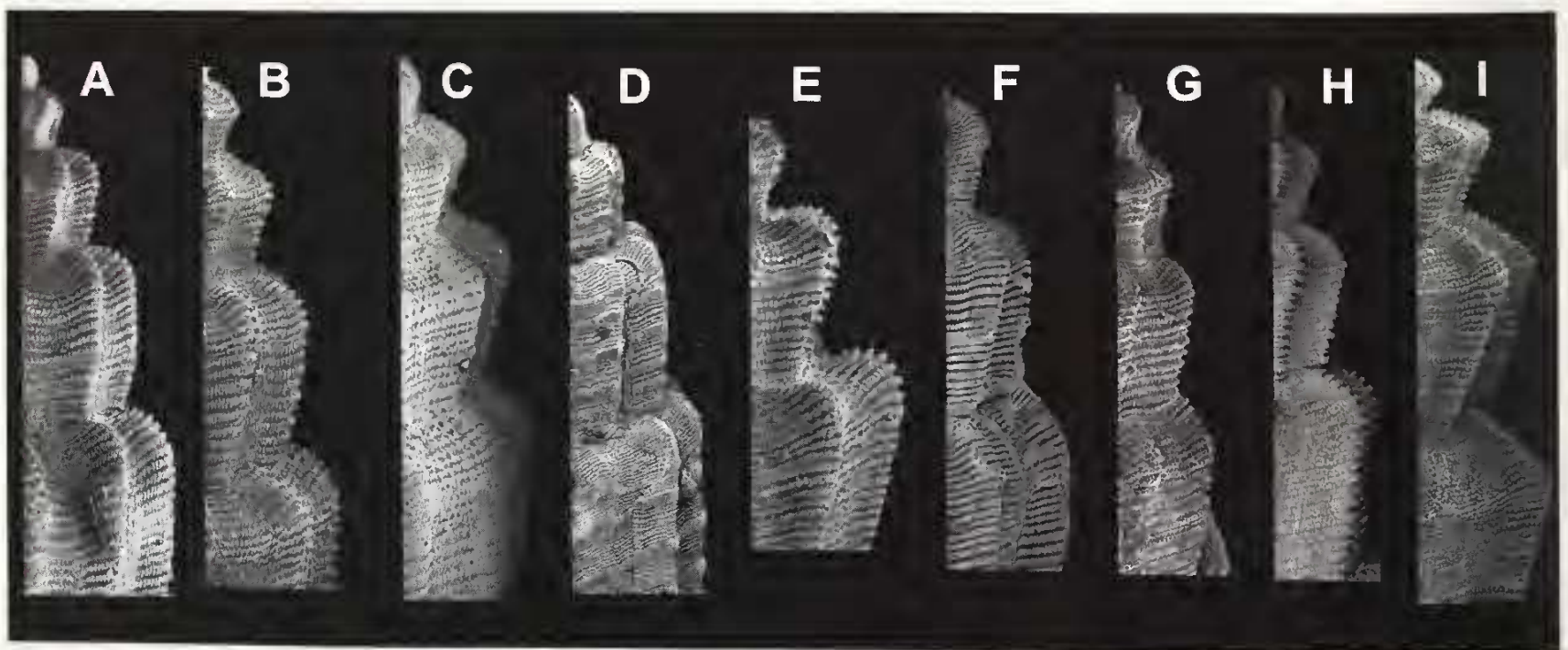


Figure 11. A-I. Comparative profile of the different species. **A-B.** *Agathotoma candidissima* (C. B. Adams, 1845); **C.** *Agathotoma ecthymata* (García, 2008); **D.** *Agathotoma apocrypha* (García, 2008); **E.** *Agathotoma castellata* (E.A. Smith, 1888); **F.** *Agathotoma kirshi* spec. nov.; **G.** *Agathotoma asthenika* spec. nov.; **H.** *Agathotoma eduardoi* spec. nov.; **I.** *Agathotoma prominens* spec. nov.